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**CLARK COUNTY**  
WASHINGTON

**AUDITOR**  
**GREG KIMSEY**

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# **Investments in Energy Conservation**

**Clark County Auditor's Office**  
**Audit Services**

**Report # 11-1**

**September 21, 2011**



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## Transmittal and Executive Summary

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Date: September 21, 2011

To: Board of County Commissioners

From: Julie Jackson, Senior Analyst/Auditor, Auditor's Office

Subject: Audit of the Investments in Energy Conservation

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In 2008, the Board of County Commissioners agreed to make facility investments to achieve energy savings. A performance audit of this function was designed to answer what was invested, expected, reported and, most importantly, what have been the results.

The \$8 million investment was in solar projects and more efficient lighting and heating/ventilation covering eleven sites. Energy use at those sites was 21% less in 2010 compared to 2007. The county also received over \$400,000 in one-time rebates and incentives.

Clark County sought and received other benefits in this project including:

- Demonstrated a major sustainability project;
- Made capital improvements such as the jail roof and boilers; and
- Improved lighting options at the Clark County Event Center.

The audit report contains two recommendations:

1. The county should scrutinize the contractor's self-reporting on energy savings by using outside expertise and the county's knowledge of its own operations.
2. In the future, the Board should be presented with decision options and full discussions on positive and negative aspects of proposals.

The audit team commends management for the success of the project and for their cooperation during the audit.

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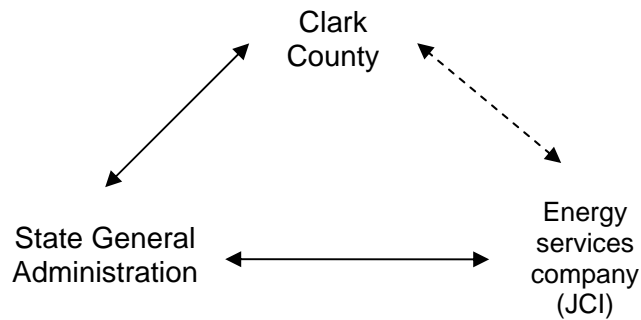
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Introduction	In 2008, the Board of County Commissioners approved a \$7.8 million project to save energy and demonstrate sustainability. The project was designed to be self-funding through savings in energy bills, maintenance, and other incentives. If successful, the county would reduce its energy bill \$340,000 in the first year and receive a one-time \$315,000 incentive from Clark Public Utilities.
<i>Audit Scope and Methodology</i>	This performance audit was undertaken to identify whether the county has received the expected savings. Our report covers the energy savings performance contract entered into in 2008 through the State of Washington. We do not express an opinion on the quality or quantity of hardware deliverables in the contract. Rather, we focus on what was invested, expected, and monitored; most importantly, we wanted to report on the results. (See our audit methodology in Appendix A.)
<i>Results and Findings</i>	<p><u>Expectations and project results:</u> Most of the expectations have been met including:</p> <ul style="list-style-type: none"> <li>• Clark County successfully implemented a major sustainability project,</li> <li>• The county earned incentives from Clark Public Utilities,</li> <li>• Needed capital improvements were made, and</li> <li>• Energy savings appear to have been met, subject to assumptions we discuss in Appendix E.</li> </ul> <p><u>Monitoring:</u> The project contract includes ongoing guarantees of energy savings. County staff did not initially require the contractor's reports, or question the reports once they started, or ensure that an intended independent review took place. Therefore, the staff was unable to support that the energy savings had been achieved, and we performed alternative analyses. We discuss monitoring starting at page 8.</p> <p><u>Information presented for the County Board's consideration:</u> Our analysis showed significant ranges in positive versus negative cash flows for the different project components. The Board should have the opportunity to consider such important factors before approving projects.</p>

## Background Overview

Washington law RCW 39.35A allows municipalities to have performance-based contracts for energy equipment and services. In performance-based contracts, the contractor pays the difference if the savings are not met. As the Washington Department of General Administration (GA) holds a master contract, the county did not have to go through the time and expense of a separate bidding process.

Clark County's project involves two contracts: (1) between Clark County and GA to manage the energy services project, and (2) between GA and an energy services company, Johnson Controls, Inc. (JCI), for design and construction.



## Contract Administration and Roles

The county's contract with state GA enlists GA to represent the county's interest in the design and construction process. GA's technical services included: selecting an energy service company; identifying potential conservation measures and savings; negotiating; identifying and assisting with funding sources; reviewing and approving the energy audit and technical studies; assisting with project acceptance.

## Investment

After the audit commenced, the Board increased the authorization to include construction-period interest missing from the 2008 authorization. The total changed from \$7.8 million to nearly \$8 million.

## Expectations

Energy costs for the selected sites were \$1.6 million in 2007. In addition to saving energy, the project was presented to the Board as:

- providing needed capital improvements (e.g., a new jail roof),

- being a state-sanctioned project,
- gaining Clark Public Utilities incentives (\$315,000 the first year and another \$76,000 over nine years),
- exemption from state sales tax for solar project materials and
- being available at a favorable financing rate.

The project also followed the Board's 2007 sustainability policy which is a commitment to conserve natural resources and consider environmental impacts in operating public facilities. The policy is attached as Appendix B.

The project is composed of five components; three conserve energy and two capture solar energy. Here are the components in terms of costs and projected savings.

	<i>Investment</i>	<i>Projected Annual Savings</i>	<i>Years to Payback</i>
Lighting	\$ 739,614	\$ 138,000	5
HVAC equipment	1,732,486	69,000	25
HVAC controls	1,795,450	149,000	12
Electricity (solar photovoltaic)			
Less: jail roof	1,903,129	8,000	154
Net electricity project	<u>-672,000</u> 1,231,129		
Hot water (solar thermal)	1,816,732	19,000	96

The General Services Director said the Board approved the project knowing the different components had a wide range of payback periods with the understanding the blended period was within the 20 year capital lease.

We analyzed the cash flows for (1) lighting and HVAC projects compared to (2) solar projects. We used the contractor's estimates of energy savings for each type, and allocated debt service based on each project-type's cost. The estimated net cash flow for 20 years was:

Lighting and HVAC projects	\$5,366,629
Solar projects	(\$4,333,857)

Lighting: 8,278 light fixtures and 452 sensors were either retrofitted or replaced, saving annually (per the contractor's reports) nearly 2 million kWh and \$121,000. County sites included downtown, Center for Community Health, 78<sup>th</sup> Street, fairgrounds, 149<sup>th</sup> Street and the jail work center.

HVAC equipment and controls: Heating, Ventilation, and Air Conditioning (HVAC) includes mechanical systems at the courthouse, jail, jail work center, and fairgrounds. It also includes control system improvements at eight sites.



*One of the new natural gas boilers for the jail*

Solar power: There are two aspects for capturing solar power: 1) photovoltaic, for generating electricity, and 2) photothermal, for heating water.

Originally, electricity was to be generated from four rooftops, but one building couldn't hold as much equipment as expected, so a fifth building was added to the mix. The solar panels' total capacity is 155 kilowatts.



*Jail roof: flat panel (thin film) photovoltaic and upright panels for photothermal*

Preheating water is done through collector panels covering just under 5,500 square feet for six buildings. The solar-heated fluid is run through piping in storage tanks to exchange the heat to the water. The jail system has most of the arrays: more than 2,000 square feet of solar collectors at the main jail, and 2,300 square feet at the jail work center.



*Pre-heated water tanks at the main jail (holding 4,785 gallons)*

### *Monitoring*

Performance based contracts have several advantages over traditional expense reimbursement contracts, primarily that vendors are accountable for results. In this performance contract, the result is that certain energy savings and financial targets will be achieved. Further, these savings are “guaranteed” by the vendor, meaning that if these savings are not achieved, the vendor agrees

to reimburse the county for any shortfall.

The contract specifies that savings are calculated in one of two ways depending on the type of project: either non-measured (stipulated) or measured. Non-measured benefits have just one-time measurements in the pre- and post-retrofit installation period, followed by four annual site verification visits. The calculated benefits are presumed to function for the life of the contract. The contract does not measure benefits from three other aspects, i.e., these savings are stipulated: operations and maintenance savings; capital cost avoidance; and rebates/incentives from Clark Public Utilities. The buildings under the non-measured savings are:

- Jail Work Center
- Event Center (fairgrounds)
- 149<sup>th</sup> Street buildings
- 78<sup>th</sup> Street buildings
- Medical Examiner's office
- General Services building
- Juvenile

Measured benefits compare current energy consumption against a base year (2007) and, as a consequence, monitoring the results of the project becomes critical.

The contract requires that the vendor provide the county with its calculation of the energy savings and that staff at the State Department of General Administration use their expertise to independently validate these calculations.

The measured buildings are:

- Public Service Center
- Center for Community Health
- Courthouse/Corrections (Jail)

At the beginning of our audit, there was an absence of accurate monitoring:

- Citing budget concerns, management started the measurement & verification process a year later than originally planned, in May 2010 rather than 2009.
- The contractor had not sent the reports to the state as required to validate the vendor's calculations; we have subsequently (February 2011) been informed by the State that "the savings seem to be there."
- The vendor's first quarterly reports did not contain backup and additional information required by the

contract; this condition was corrected with the third quarterly report received March 2011.

- Internal information posted on the county web site included incomplete and erroneous information.

Examples of the last point include:

- The entire year of 2007 was compared to one-half of 2010 so results for each building were greatly exaggerated at 43% to 79% savings. Because 2010 was not complete, the year-to-year change should have shown "n/a."
- The courthouse and jail were on the same electric meter in 2007, with all of the use recorded as "jail". Later, after two meters were installed, the report showed a large reduction in electricity use for the jail because the courthouse had been separated.
- The boiler in the jail was converted from electricity to natural gas as part of the project. Therefore total energy use should have been combined into a single, comparable measure: therms.
- The jail had been reported at 78% energy savings. Once 2010 was complete, we calculated that the actual energy reduction for the jail was 3%.

Because of the lack of good data at the early stage of the audit, we took a simple approach to energy savings. We conclude that with certain adjustments and assumptions, energy use has decreased 21%. Our calculation and limitations are included in Appendix E.

## *Results*

The energy services company self-reports that the guaranteed savings have been met and exceeded. They use the International Performance Measurement and Verification Protocol (IPMVP) for their technical analysis. The IPMVP compares the baseline year (in our case, 2007) to the current year with adjustments for weather, occupancy, and operating changes.

Post-construction results: After construction, the contractor reported they had not met all of the guaranteed energy savings for the 300-day construction period. Instead of receiving a check from the contractor to use toward the additional utility bills, the county used a shortfall credit (\$20,000) towards additional projects.

Discussion on fairgrounds infrared heaters: one of the HVAC mechanical and control changes was at the Clark County Event Center (the fairgrounds). The Exhibit Hall is nearly 100,000 square feet with heating from large air handlers. The plan was for new gas-fired infrared systems to save \$22,000 annually as the primary source of heat when no events are scheduled.

There is a continuing difference of opinion on why the infrared heaters have not resulted in savings. The contractor said the Event Center Director requested changes in the control sequence, negating the savings. The Event Center Director, however, said the heaters were too small for the volume of the Exhibit Hall, and running them for two days prior to an event only brought the temperature up by two degrees. We asked the General Services Director to revisit this issue to see if the county is missing an opportunity to save \$690,000 over the next 20 years.

Management Response: *"We are working this issue with the Washington State Department of General Administration and with Johnson Controls to either reengineer the system or refund the cost."*

#### *Other Benefits*

In addition to energy savings, Clark County gained other benefits including:

- New jail roof and boilers (which were 25 years old).
- Improved lighting controls at the Event Center, with programmable zones to better host a variety of events.
- Better air handling at the Medical Examiner's building.
- Reduced carbon impact on the environment. Clark County's 2010 Sustainability Performance Report showed carbon dioxide emissions reduced 1,409 metric tons since 2008 for the buildings in the energy project.

#### **Recommendations**

1. Monitoring: The county delayed the measurement and verification reports from the contractor for one year for budget reasons, then did not question the data once the quarterly reports started, and the contractor did not send the reports for the state's experts to review. As a result, county leaders did not have accurate information on how well the energy

savings project turned out.

**We recommend** that the county take advantage of outside expertise when it is available and also scrutinize, based on the county's knowledge of its own operations, the reasonableness of what the experts are reporting.

Management Response: *"The performance contract called for Measurement and Verification (M&V) during construction/implementation. The contractor self-reported a \$20,000 savings shortfall, which we invested in further improvements. We were encouraged and impressed with the forthright reporting by the contractor. Before and during implementation the Facilities Management budget was reduced by \$1.3 million. This caused us to delay the start of the five year measurement and verification contract for a year, as the cost was over \$50,000 per year. During this period we used utility bills as a proxy for the M&V reporting. It was clear from reviewing our utility bills that savings were substantial. In addition, much of the savings in this contract are stipulated, which means that they aren't measured because we know we will achieve those savings. Based on this we thought our decision to delay the M&V process was fiscally prudent and low risk."*

2. Decision-making: We were unable to find where the Board had been presented an analysis on individual components as optional decision packages. Our analysis showed a significant difference in positive versus negative cash flows for the different project types. In the future, the Board should have the opportunity to consider such important factors. The staff report requesting authorization of the project only stated, "Collectively, these measures will save and generate enough energy to fund the project over its 20 year life."

**We recommend** the Board have data that illustrates the extent of these factors, leading to robust discussions around options, costs and benefits, and resulting in fully informed decision making.

Closing  
Comments

In their review of the draft report, the management of General Services generally agreed with the results of the audit. Their response is included as Appendix F.

*Commendation*

Staff and management were cooperative and professional during this audit. We commend and thank everyone for their assistance.

## ***APPENDIX A: Audit Methodology***

The methodology for this review included:

1. Interviewing managers, staff, and the latest state contract manager to gain: background information; their expectations from the project and perceived results; an understanding of available systems and reports; and to confirm our conclusions as the audit progressed.
2. Reviewing documents such as the authorizing staff report, capital lease, progress reports, IPMVP, and financial reports.
3. Observing some of the HVAC and solar projects.
4. Testing the Utility Manager Software to the extent needed to confirm whether data from the system could be used to meet our audit objectives.
5. Analyzing and adjusting internal and external reports to determine whether the project's expectations were met.

The scope of this review does not include the "Phase I" energy projects started in 2002, nor subsequent projects funded by the American Recovery and Reinvestment Act grant for energy efficiency.

We conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

## ***APPENDIX B: Clark County Sustainability Policy***

Clark County is committed to fostering a safe, secure future that conserves natural resources while meeting basic human needs, including clean water, air, and food, along with shelter, education, and employment. This commitment to a sustainable future will be a key consideration in making public policy, developing public programs, operating public facilities, and delivering public services.

All employees must therefore recognize and respect the connections between economic, environmental, social, and health systems in meeting their explicit and implied responsibilities to current and future generations. Our goals are to:

- Lead by example;
- Encourage innovation in both public and private pursuits;
- Promote and demonstrate efficient and effective use of renewable and consumable resources;
- Collaborate with public and private partners on projects aimed at sustainability;
- Continuously enhance our perspective and expertise in making sustainable choices on behalf of the citizens and communities of Clark County; and
- Identify and pursue new opportunities that promote sustainable practices.

To implement this policy and monitor its impacts, the County Administrator will convene a sustainability advisory committee to prepare an annual inventory of the county's sustainability efforts, report on progress related to the stated policy goals, and recommend a biannual budget to the Board of County Commissioners aimed at funding sustainable choices.

October 16, 2007  
Staff Report #317-07

### **APPENDIX C: *Guaranteed Project Benefit***

	Total Guaranteed Project Benefits <sup>1</sup>	Debt Service and Other Costs <sup>2</sup>
2008 (install)	\$ 158,417	
2009	723,793	\$ 813,562
2010	513,731	537,688
2011	544,271	535,362
2012	555,973	565,910
2013	467,795	476,285
2014	488,100	482,595
2015	509,310	507,542
2016	523,464	522,284
2017	546,605	544,676
2018	570,776	568,761
2019	592,879	591,035
2020	619,250	617,051
2021	646,796	644,499
2022	675,569	673,170
2023	705,623	703,117
2024	737,016	734,399
2025	769,807	767,073
2026	804,058	801,204
2027	839,835	836,853
2028	877,207	339,986
<b>Totals</b>	<b>\$ 12,870,274</b>	<b>\$ 12,263,052</b>

1: Source: Energy Savings Performance Contract, Johnson Controls, March 26, 2008

Total Guaranteed Project Benefits include:

Utility cost avoidance	\$10,878,851
Operations & maintenance cost avoidance	\$ 1,251,093
Future capital cost avoidance	\$ 349,015
Rebates & incentives	\$ 391,315

2: Source:

Debt service payment schedule	\$12,028,932
Five years' measurement & verification	\$ 234,120

## APPENDIX D: *Details on the Investments in Energy Conservation*

County executed interagency agreement with Washington

State Department of General Administration ..... July 2007

BOCC authorization for energy services contract,

\$7,778,663 ..... April 22, 2008

State gives Johnson Controls, Inc., "Notice to Proceed" ..... April 24, 2008

Construction period 300 calendar days ..... to February 18, 2009

Last actual construction date per contractor ..... March 15, 2009

Final acceptance by county facilities management ..... September 16, 2010

Amended authorization \$7,987,411 ..... February 2011

Site	Lighting and controls	HVAC mechanical	HVAC controls	Solar PV	Solar hot water
Public Service Center	x		x	x	x
Jail Work Center	x	x	x		x
Jail	x	x	x	x	x
Event Center (fairgrounds)	x	x	x		
Center for Community Health	x		x	x	x
Medical Examiner	x		x		
78 <sup>th</sup> Street Shops	x		x		
149 <sup>th</sup> Street	x		x		
General Services	x			x	
Courthouse		x			
Juvenile				x	
Light fixtures:	8,278	Expected kW:		159.3	
Light sensors:	452	Installed kW:		155	
Collector square footage:					
Expected					5,494
Actual					5,495
Storage gallons:					
Expected					11,766
Actual					11,704

## ***APPENDIX E: Simple Approach to Energy Cost Savings***

Normally, management would provide us a complete, documented analysis of the project results. This project contract also expected reviews by an independent contracted expert. The department was unable to provide this level of documented results.

One of the steps we took, therefore, was a simple and non-scientific analysis: do the results show up through the utility bills? With this approach, we needed to include certain factors:

1. The original expectation for \$22,000 in annual savings from infrared heaters at the fairgrounds was “written off” (discussed on page 11).
2. We used the stipulated savings of \$49,309 in lighting changes at the fairgrounds rather than researching their utility bills (they are not in the database with the rest of the county’s utility information).
3. We used the contract’s presumed utility cost escalator at 4.5% per year.

With those assumptions and adjustments we compared 2007 to 2010 and found the results to be reasonable.

Adjusted expected savings	\$ 335,000
Adjusted actual savings	328,000

While the utility bill reduction is reasonable, we cannot assert the savings are directly from the “Phase II” projects. For instance, we expect some of the savings were from:

	<u>2007</u>	<u>2010</u>	<u>Change</u>
<u>Fewer staff</u> <sup>1</sup>	1,402	1,202	- 14%
<u>Fewer inmates</u> <sup>2</sup>	769	685	- 11%
<u>Heating degree days</u> <sup>3</sup>	4,374	4,187	- 4%
<u>Cooling degree days</u> <sup>3</sup>	400	314	- 22%

### ***Sources:***

1. *Staffing from position lists for each year, excluding positions not located in the project buildings. Examples of exclusions: Sheriff’s deputies, road operations, Prosecuting Attorney’s Office, parks operations.*
2. *Inmates from Custody annual reports for [2007](#) and [2010](#), average daily population.*
3. *Heating/cooling degree days from weather history, location PDX, [www.wunderground.com/history](http://www.wunderground.com/history)*



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GENERAL SERVICES

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TO: Julie Jackson, Auditor's Office

FROM: Mark McCauley, Director, General Services

DATE: September 16, 2011

SUBJECT: Response to Draft Audit Report: Investments in Energy Conservation

We have reviewed the subject draft audit report and find it accurate and fair. For clarity, however, we do offer a number of comments.

**Results and Findings/Monitoring:** The performance contract called for Measurement and Verification (M&V) during construction/implementation. The contractor self-reported a \$20,000 savings shortfall, which we invested in further improvements. We were encouraged and impressed with the forthright reporting by the contractor. Before and during implementation the Facilities Management budget was reduced by \$1.3 million. This caused us to delay the start of the five year measurement and verification contract for a year, as the cost was over \$50,000 per year. During this period we used utility bills as a proxy for the M&V reporting. It was clear from reviewing our utility bills that savings were substantial. In addition, much of the savings in this contract are stipulated, which means that they aren't measured because we know we will achieve those savings. Based on this we thought our decision to delay the M&V process was fiscally prudent and low risk.

**Results/Discussion on fairgrounds infrared heaters:** We are working this issue with the Washington State Department of General Administration and with Johnson Controls to either reengineer the system or refund the cost.